

CALIFORNIA DIVISION OF MINES AND GEOLOGY

FAULT EVALUATION REPORT FER-87

January 25, 1979

1. Name of fault

San Gorgonio Pass fault (a new name).

2. Location of fault

This fault extends in an east-west direction along the northern side of San Gorgonio Pass, to the west of the mouth of Whitewater Canyon, Whitewater quadrangle, Riverside County, California (figure 1).

3. Reason for evaluation

This locality lies within the 1978 study area of the 10-year program for fault evaluation.

4. List of references

Allen, C.R., 1957, San Andreas fault zone in San Gorgonio Pass, southern California: Geological Society of America Bulletin, vol. 68, p. 315-350.

California Division of Mines and Geology, 1974, Special Studies Zones Official Map, Whitewater Quadrangle.

Hope, R.A., 1969, Map showing recently active breaks along the San Andreas and related faults between Cajon Pass and the Salton Sea: U.S. Geological Survey open-file map.

Real, C.R., Parke, D.L. and Topozada, T.R., 1977, Magnetic tape catalog of California earthquakes, 1900-1974: California Division of Mines and Geology.

Aerial Photography

Designation: Fairchild C-16107
Date: January 31, 1951
Scale: 1:19,680
Type: Black & White, vertical stereo
Coverage: San Gorgonio Pass, Desert Hot Springs area, and eastward into the Indio Hills.
Availability: Fairchild aerial photography collection, Geology Department, Whittier College, Whittier, California.

Designation: WRD 5D6
Date: June 17, 1966

Scale: 1:14,600
Type: Black and White, vertical stereo
Coverage: All of the San Andreas and other major faults in California, including the Banning fault.
Availability: California Division of Mines and Geology, Los Angeles District office, Los Angeles, California.

5. Summary of available data:

There is no existing data on this fault. The writer is apparently the only person who has recognized the fault at this time.

6 & 7. Interpretation of aerial photography and field observations

The San Gorgonio^{Pass} fault extends in an east-west direction along the northern side of San Gorgonio Pass. The fault lies about 2km south of the Banning fault, and is very nearly parallel to that fault. Recognizable surface features generated by this fault extend from about one kilometer west of the mouth of Whitewater Canyon to about 5km west of the canyon (figure 3). The fault trace is characterized by a series of south-facing scarps that offset alluvial fan surfaces. These alluvial fans have been generated by south-flowing streams that have dissected the hills immediately to the north of San Gorgonio Pass.

I first observed the scarps on aerial photos (Fairchild C-16107, 1951, frames 2-121 to 2-126) while reviewing other faults in this area and to the east in the Desert Hot Springs area. On the photos, the scarps are very subtle. Some of the scarps shown on figure 3 are visible on the ground, but I am unable to see them in either of the 2 photo sets available to me.

All of the information annotated on figure 3 is based on on-the-ground observation. The vertical offset of the alluvial surface at the scarp is given in meters. Where the maximum scarp angle is greater than

about 15° , the value is given. In places where the scarp angle is quite low, I have given values for the width of the scarp -- that is, the horizontal distance from the base to the top of the scarp. In some cases, the feature that I refer to as a scarp may in fact be a rather localized monocline along which surface rupture did not occur.

The scarps that I have mapped along the San Geronio Pass fault average about 1.0m in height. The highest measured value is about 2.0 m near the eastern end of the mapped fault zone. The highest maximum scarp angle is 35° , also near the eastern end.

As shown on figure 3, the clear surface expression of this fault is quite discontinuous. Over a 4km distance, only about half that distance is represented by visible scarps. It is clear, in some localities, that the scarp has been destroyed by subsequent outwash across the fan surface. However, along the trend of the fault, the fan surface generally shows a broad monoclinial warping extending from about 40m below the fault trace to about 75m above the trace. The apparent total offset of the fan surface across the monocline is 5m to 10m, northern side upthrown. This suggests that most of the near-surface offset along this fault is accommodated by bending of the poorly consolidated alluvial strata, and that rupture extends all the way to the surface during only some events and for only part of the fault trace.

I have been unable to find evidence for faulting along the alluvial fan surfaces to the west of the westernmost scarps mapped in figure 3. I have examined aerial photos (WRD 5D6, 1966) for at least 10km farther to the west. (For reference, the community where I mapped the westernmost scarps of the fault is called "West Palm Springs" on the local road signs

and on some road maps). Also, I have been unable to find specific evidence for the continuation of the fault trace to the east of the easternmost scarp mapped on figure 3. However, the outwash of the Whitewater River would have destroyed all but the latest Holocene features.

I have observed no actual exposures of the fault plane of the San Gorgonio Pass fault; there are no natural exposures of sufficient depth along this stretch of alluvial apron. However, because of the apparent monoclinial warping of the fan surface, which tends to require a certain amount of horizontal shortening, I suspect that the fault is a north-dipping reverse or thrust fault.

The existing official special studies zones map for the Whitewater quadrangle (figure 4) shows two faults in the near vicinity of the San Gorgonio Pass fault. These are segments of the Garnet Hill fault. One of these trends about N 60° W and lies immediately north of the San Gorgonio Pass fault. I checked parts of this trace in the field and observed it to juxtapose reddish older alluvium on the southwest against grayish tan older alluvium on the northeast. The fault plane appears to be vertical or dipping steeply to the northeast. The geomorphic features along this fault include notches, benches, possible right-deflected drainages, and possible right-offset ridge spurs. These features occur only within the older alluvium. At the western end, this fault segment is shown cutting younger alluvium. I see some irregularity in the alluvial surface there, but it is not clearly of fault origin. The other fault trace also trends about N 60° W and is shown crossing the mouth of Whitewater Canyon and extending for a short distance into the hills immediately to the west of the canyon. I see specific evidence for the location of this fault to the northwest of the community

of White Water. Along the western half of the lowermost one kilometer of Whitewater Canyon there is a low terrace surface that lies a maximum of about 10 m above the present river channel. This terrace surface is apparently offset vertically about 10 m, northern side upthrown, by the fault near the mouth of the canyon. I have not measured this scarp on the ground, but on the photos it appears to be quite gentle, with a maximum scarp angle of less than 15° . I do not know the age of this offset terrace surface, but it certainly may be as young as Holocene age. I see evidence, in the form of notches and aligned drainages, for the westward continuation of this fault into the hills immediately west of the mouth of the canyon -- as mapped by Allen (1957).

I have also examined, on aerial photos (Fairchild C-16107, 1951), the unnamed fault segment that extends in a north-northwesterly direction along the eastern side of Whitewater Canyon, just north of the Banning fault. Allen (1957, Plate 4) calls this the Whitewater fault, and I have labeled it as such on Figure 4. I observe no geomorphic features along the trace that appear to be a direct result of surface offset. The visible geomorphic expression of the fault appears to arise only from differential erosion processes at the fault. A re-examination of the original mapping of this fault (Allen, 1957, Plate 4) shows that it does not cut Holocene units. It, in fact, is shown to pass beneath, and not out, the late Pleistocene Cabezon Conglomerate.

Seismicity

It is not apparent, in the distribution of epicenters (figures 2a and 2b), that any of the seismicity is specifically related to the San Geronimo Pass fault. There is a clustering of events about 15 km to the west along the Banning fault, and about 15 km to the east-northeast, in the

vicinity of Desert Hot Springs, along the Mission Creek fault.

8. Conclusions

I conclude that the San Gorgonio Pass fault has been active as recently as Holocene time. The alluvial surface that has been offset by the fault is probably of Holocene age. Furthermore, the steepness of the scarp angle (as great as 35°) strongly suggests that it was formed as recently as Holocene time.

The two segments of the Garnet Hill fault that I briefly examined do not appear to have been active as recently as the San Gorgonio Pass fault. However, I see no conclusive evidence that these fault segments have not been active as recently as Holocene time.

I conclude that the Whitewater fault has not been active during Holocene time.

9. Recommendations

I recommend that a new special studies zone be established along the San Gorgonio Pass fault. I recommend no changes for the existing zone along the Garnet Hill fault (on the Whitewater quadrangle) except to facilitate the junction with the new zone along the San Gorgonio Pass fault. I recommend that the existing zone along the Whitewater fault be deleted.

10. Investigating geologists name; date

Drew P. Smith

DREW P. SMITH
January 25, 1979

*I concur with
the recommendations.
ELM
2/23/79*

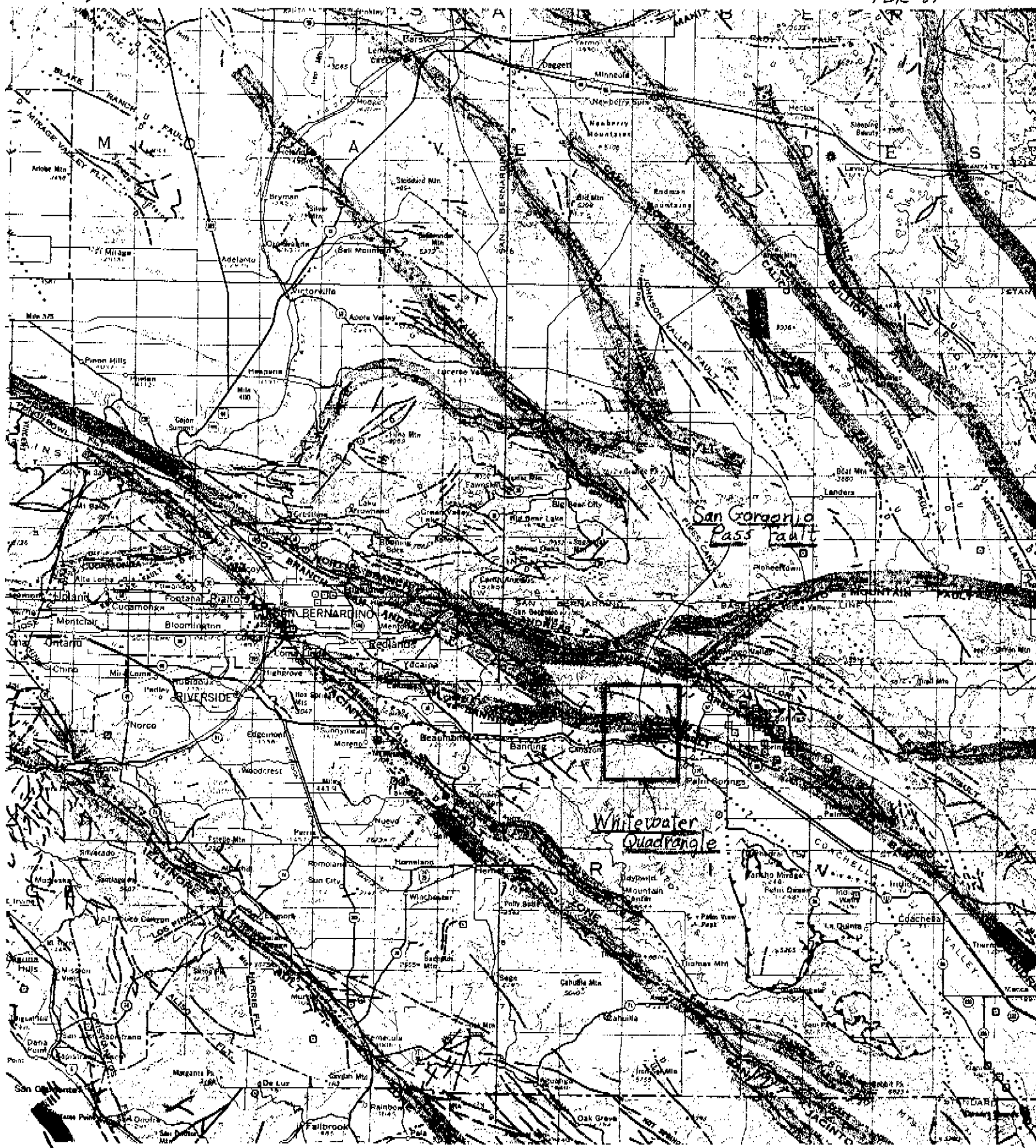


Figure 1. Index map showing location of the San Geronio Pass fault. Map is modified from Jennings (1975).